VICTOR®

930-2

INSTRUCTION MANUAL

SCIENTIFIC CALCULATOR

IM-608**2.1VI

CONTENTS

I. HOW TO USE THIS CALCULATOR

1.Keys

Power ON/ OFF and Clear Keys

[ON] **Power ON Key :** Turn on this unit and start calculations.
All registers except memory register are cleared when power is turned on.
Auto Power OFF Function : If not used for about 10 minutes, the unit is automatically turned
off to save power.

[OFF] **Power OFF Key :** Turn off the power and clear only the display.

[C/CE] **Clear/Clear Error Key :** Clear the last entered numbers and clear the error.

[AC] Clear the contents of all registers even in the memory.

Numeric Entry Keys

[0]~[9] **Numeric Keys :** To enter digits.

[.] **Decimal Point Key :** To enter decimal point.

[EXP] **Exponential Key :** To enter exponent.
Example: 35×10^{43}→[3][5][EXP][4][3] ($35.^{43}$)

[+/-] **Sign Change Key :** Change the sign (+ or -) of mantissa and exponent.

[→] **Backspace Key :** Press this key once and clear the last input digit.

Example:

Value	Operation	Display
12345	[1][2][4]incorrect entry [→] [3][4][5]	124. 12. 12345.

Mode Selection Keys

[INV] **Invert Key :** Perform the functions as key shows and the asterisks (*) in the explanations serve as mark.
Example: $Sin^{-1}0.5$→**[.][5] [INV][sin^{-1}]**

[MODE] **Calculation Mode Key :** Assign calculation mode, press **[1]~[5]** after pressing this key and sets the calculation mode as follows:

Key Operation	Mode	Display Indica tor
[MODE][1/→DEC]	Decimal Calculation Mode	DEG
[MODE][2/→BIN]	Binary Calculation Mode	BIN
[MODE][3/→OCT]	Octal Calculation Mode	OCT
[MODE][4/→HEX]	Hexadecimal Calculation Mode	HEX
[MODE][5/→SD]	Statistical Calculation Mode	SD DEG

[FLO][SCI][ENG] *Display Mode Key : The display mode will change when the key is pressed as follows

[FLO] Floating Mode
[SCI] Scientific Exponential Mode
[ENG] Engineering Exponential Mode

Example

Operation	Display	Explanation
([INV][FLO])		(Floating Mode)
[1][2][3][4][5]		Floating Mode
[6][7][8][×]		
[1][0] [=]	123456780.	
[INV][SCI]	1.2345678^{08}	Scientific

[INV][ENG]	123.45678 ^{06}	Exponential Mode Engineering Exponential Mode

Display Range

Scientific Exponential Mode : X=0 And $10^{-99} \leqq |X| < 10^{100}$

Engineering Exponential Mode : X=0 And $10^{-99} \leqq |X| < 10^{100}$

Exponent: Multiple of 3

Mantissa: Less than 1000

In the floating mode the calculation results shows as the following:

$10^{10} \leqq |X| < 10^{100}$ Exponential Display

$10^{-99} \leqq |X| < 10^{-9}$ Exponential Display

X=0 and $10^{-9} \leqq |X| < 10^{10}$ Floating Point Display

[FIX] *Decimal Point Selection Key : To define the decimal digits number in the mantissa of the decimal calculation results. Press **[0]- [9]** or **[.]** after pressing this key and define the decimal digits as follows:

[INV][FIX][0] 0 decimal digit

[INV][FIX][1] 1 decimal digit

∫

[INV][FIX][9] 9 decimal digit

[INV][FIX][.] Resets the decimal specification

Example:

Operation	Display	Explanation
[INV][FIX][3]	0. 000	3 digits decimal
[1][2][3][4][5]		
[6][7][8][9][X]	123456789.0	
[.][0][0][1][=]	123456.789	
[INV][FIX][0]	123457.(*1)	0 digit decimal
[INV][FIX][5]	123456.7890(*2)	5 digit decimal

*1 The displayed value is rounded-off (5/4) within the defined range, the calculated result is retained in the register.

*2 The number is displayed with left justification. In this case, 5 decimal digits are specified, but only the 10 most

important digits are displayed. The 5th decimal digit is ignored.

[DRG] Degree/ Radian /Gradient Mode Key : To change angle units.

[DEG →] *Angle Unit Conversion Key : For converting angle units to different units ,press **[INV]** .

The relation of the units is:

$200^{GRAD} = 180^{\circ} = \pi^{RAD}$

Basic Instruction Keys

[+][-][×][÷][=] Basic Function Keys : Used for basic arithmetic calculation. Press keys as they show..

[%] *Percent Key : Used for percentage, percent add-on and percent discount calculations. Press this key after input digits and display 1/100 of the input digits.

[( ][ )] Open, Close Parenthesis Keys: Perform parenthesis calculations if digits and instructions in the register are within 6 levels.

Example:

2×(3+4) =14	[2][×][( ][3][+][4] [ )][=] (14)
1+[(4 - 3.6 + 5) ×0.8 - 6]×4.2 = - 6.056	[1][+][( ][( ][4][-][3][.][6] [+][5][ )][×][.][8][-][6][ )] [×][4][.][2][=] (-6.056)

Up to 15 continuous open parentheses can be used at one time.

Example: $5\times(((\ldots((4+2)\times3)+8\ldots$

Up to 15 parentheses

[( ] and **[ )]** always be used together. If just press the half alone, the correct result can not appear.

[( ] key is effective only when pressed immediately after a calculation instruction.

When **[( ]** is effective, "( )" appears and parentheses indicators ( ) are on the display.

[X ⇄ Y] ***Reverse Key :** Reverses the operand and the operator in the multiplication and division sequences.

Example:

$$\frac{789}{123\times456} = 0.01406718$$

[1][2][3][×][4][5][6][÷][7][8][9][INV][X ⇄ Y][=]

(0. 01406718)

<Fractional Calculations>

Enter fractions, then calculate mixed and improper fractions. Results are given in mixed fractions.

[a b/c] **Fraction Key :** To enter mixed and improper fractions.

When entering improper fraction (A/B):

A(numerator)→**[a b/c]**→B(denominator)

When entering mixed fraction (A B/C):

A(integer)→**[a b/c]**→B(numerator)→**[a b/c]**→C(denominator)

Fraction 2/3 is displayed as **<<2␣3>>**, and 1 2/5 as **<<1 2␣5>>**.

Example:

Value	Operation	Display
$\frac{2}{3}$	**[2]**	2.
	[a b/c]	2␣.
	[3]	2 3.
$1\frac{2}{5}$	**[1]**	1.
	[a b/c]	1 ␣.
	[2]	1 ␣2.
	[a b/c]	1_2 ␣ .
	[5]	1_2 ␣5.

The maximum number of digits for improper fractions is up to 6 digits for the numerator and 3 digits for the denominator, totaling 9 digits. In mixed fractions, up to 3 digits for integer, numerator and denominator are permitted, but the total is up to 8 digits.

[a b/c] can convert the fractional calculations result to the decimal digits.

Example: Calculate 1-2/3+4-5/6 and convert the result to the decimal digits.

Operation	Display
[1][a b/c][2][a b/c][3][+]	1_2 ␣3.
[4][a b/c][5][a b/c][6][=]	6_1 ␣2.
[a b/c]	6.5
[a b/c]	6_1 ␣2.

[d/c] ***Mixed/Improper Fraction Conversion Key**

It converts between mixed fractions and improper fractions.

Example: Enter 10/3 and convert to the mixed fraction.

Operation	Display
[1][0][a b/c][3]	10 ⌟3.
[INV][d/c][=]	3_1 3.
[INV][d/c]	10 ⌟3.

Memory Keys

[M+] **Memory Plus Key :** Add the digits in the independent register.

[RM] **Recall Memory Key :** Recall the independent memory contents.

[X→M] **Memory Input Key :** Used to enter the value displayed into memory and the value entered replaces any previously stored value

[X ⇄ M] ***Display/Independent Memory Exchange Key :** Exchange between the displayed number and the contents of the independent memory.

Examples

Operation	Display	Content of the Independent Register	Explanation
[1][2][3]	123.	0	
[M+]	M 123.	123	Store 123
[4][5][6][M+]	M 456	579	Add 456
[RM]	M 579	579	Recall from Register
[7][8][9][X→M]	M 789.	789	Store 789
[3][6][9]	M 369.	789	Enter 369
[INV][X ⇄ M]	M 789.	369	Exchange Display for memory
[C/CE]	M 0.	369	Clear display
[X→M]	0.	0	Clear memory

Binary / Octal / Hexadecimal Number Keys

[0]~[1] **Binary Number Enter Keys**
[2]~[9] are ignored in the binary mode.

[0][7] **Octal number Entry Keys**
[8] ~ [9] are ignored in the octal mode.

[0]~[9][A][B][C][D][E][F] **Hexadecimal Number Entry Keys**

Example:

Value	Operation	Display
AB7C	[MODE][4] [A][B][7][C]	(HEX) Ab7C.

[NEG] ***Complement Key :** Convert to the complement in the binary/octal/hexadecimal modes. Press it again, the complement revise to original digit.

Example1 Binary mode [MODE][2]
Operation Display
[1][0][1][0][1][0][NEG] (1111010110.)

Example2 Octal mode [MODE][3]
Operation Display
[1][2][3][4][5][6][NEG] (7777654322.)

Example 3 Hexadecimal mode [MODE][4]
Operation Display
[7][8][9][A][B][NEG] (FFFFF87655.)

Function Keys

About function calculation details, please refer to "Function Calculation":

[HYP] ***Hyperbolic**

[sin] Sine Key
[cos] Cosine Key
[tan] Tangent Key
[ln] Natural Logarithm Key
[e^x] Exponential Function Key
[X^2] Square Key
[1/X] Reciprocal Key
[→DEG] Sexagesimal→Decimal Conversion Key
[R→P] Rectangular→Polar Coordinates Conversion Key
[Y^x] Raising to Power Key
[π] Pi Key
[$\sin^{-1}$] *Arc Sine Key
[$\cos^{-1}$] *Arc Cosine Key
[$\tan^{-1}$] *Arc Tangent Key
[log] Common Logarithm Key
[10^x] Common Exponential Key
[$\sqrt{}$] Square Root Key
[$\sqrt[3]{}$] Cubic Root Key
[→DMS] Decimal→Sexagesimal Conversion Key
[P→R] Polar→Rectangular Coordinates Conversion Key
[$\sqrt[x]{Y}$] Multiple Root Key
[n!] Factorial Key

Statistical Keys

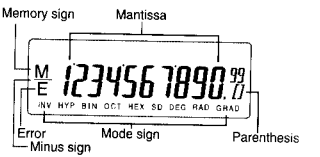
[DATA] Variable Entry (DATA) Key
[DEL] *Variable Correction (DEL) Key
[Σx] *Σx Key
[n] *n Key
[δ^{n-1}] *δ^{n-1} Key

[Σx^2] *Σx^2 Key
[$\bar{X}$] *$\bar{X}$ Key
[δ^n] *δ^n Key

Logical Calculation Keys

[AND] *AND key
[XOR] *XOR key
[NOT] *NOT key
[OR] * OR key
[XNOR] * XNOR key
Use for logical calculation of binary/octal/hexadecimal modes .

2. Display Indicator



INV : Invert
HYP : Hyperbolic
BIN : Binary Mode
OCT : Octal Mode
HEX : Hexadecimal Mode
SD : Statistic Mode
DEG : Degree Mode
RAD : Radian Mode
GRAD : Gradient Mode
( ) : Calculation in parentheses

3. Mode

Calculation in Each Mode

Calculation \ Mode		Decimal (DEC)	Binary (BIN)	Octal (OCT)
General Calculation	Basic calculation +,-,×,÷	6 levels O	6 levels O	6 levels O
	Parentheses Calculation( )	O(15)	O(15)	O(15)
	Constant Calculation	O	O	O
	Percentage Calculation %	O	X	X
	Fractional Calculation a· b/c, d/c	O	X	X
Memoy Calculation	Independent Memory Calculation M+,RM, X→M, X≠M	O	O	O
Function Calculation	One-variable function calculation.	O	X	X
	Two-variable function calculation. R→P, P→R	O	X	X
	Y^x, $\sqrt[x]{Y}$	O	X	X

Statistical Calculation	One-variable statistical calculation	X	X	X
Logical Calculation	AND.OR.XOR.XNOR. NOT	X	O	O
Comple -ment Calcula - tion	NEG	X	O	O
Entry	0,1	O	O	O
	2~7	O	X	O
	8,9	O	X	X
	A~F	X	X	X
	[.][EXP] Key	O	X	X
	[+/-] Key	O	X	X
	[→]Key	O	O	O
Clear	[C/CE]	O	O	O
Display	FLO,SCI, ENG	O	X	X
Decimal	FIX	O	X	X
Angle	DRG, DEG→	O	X	X
Reverse	[X ≠ Y]	O	O	O

Calculation \ Mode		Hexade -cimal (HEX)	Statistic -al (SD)
General Calculation	Basic calculation +,-,×,÷	6 levels O	3 levels O

	Parentheses ( )Calculation (15)	O	O
	Constant Calculation	O	O
	Percentage Calculation %	X	O
	Fractional Calculation a· b/c. d/c	X	O
Memory Calculation	Independent Memory M+,RM, x→M, X⇄M	O	O
Function Calculation	One-variable function calculation.	X	O
	Two-variable function calculation R→P,P→R	X	O
	Y^x, $\sqrt[x]{Y}$	X	O
Statistical Calculation	One-variable statistical Calculation	X	O
Logical Calculation	AND,OR,XOR,XNOR, NOT	O	X
Comple - ment Calculation	NEG	O	X
Entry	0,1	O	O
	2~7	O	O

	8,9	O	O
	A~F	O	X
	[·][EXP] Key	X	O
	[+/-] Key	X	O
	[→] Key	O	O
Clear	[C/CE] Key	O	O
Display	FLO,SCI,ENG	X	O
Decimal	FIX	X	O
Angle	DRG,DEG→	X	O
Reverse	[X⇄Y]	O	O

4. Calculation Procedure

Calculation ` Priority

The priority is automatically set by the calculator, it means algebraic forms can be entered just as they are written. The calculation priority shows as follows:

High Priority

- One-variable function
- Calculation in ( )
- Y^x, $\sqrt[x]{Y}$
- × ÷
- + -

Example:

$5 \div 4^2 \times 7 + 3 \times 0.5^{\cos 60^\circ} =$

Calculation Order

① ② ③ ④ ⑤ ⑥ ⑦

Mode: DEG

Operation		Display
[5][÷]	(	5.).....①
[4][X^2]	(	16.).....②

[×]	(	0.3125).....③
[7][+]	(	2.1875)
[3][×]	(	3.)
[.][5][Y^]	(	0.5)
[6][0][cos]	(	0.5)..... ④
[=]	(4.308820344)...⑦	

Levels

During actual calculation, totally up to 6 levels of calculations can be stored in the register.

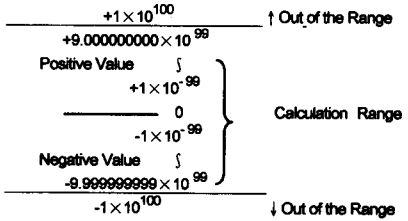
Example: 1 + 2 × ((Sin30° + 6 × (2 + 3 × 1/5)) =

Levels ① ② ③ ④ ⑤ ⑥

5. Calculation Range

Decimal Numbers

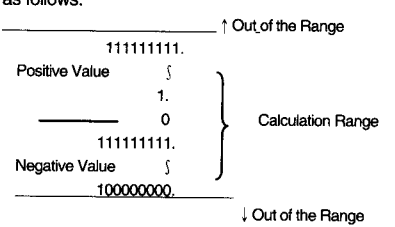
A maximum of 10 digits in the mantissa, or 10 digits in the mantissa with 2 digits in the exponent, can be entered or displayed. Negative value need add a minus sign(-). The calculation range is defined as follows



*If the calculation result is out of the range, an error occurs.

Binary numbers

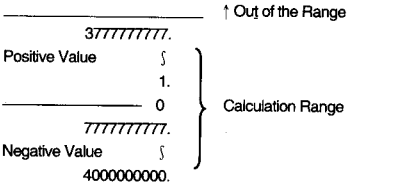
Up to 10 digits of binary integers can be entered and displayed. The negative binary values are expressed by their complement. The calculation range is defined as follows:



*If the calculation result is out of the range, an error occurs.

Octal Number

A maximum of 10 octal digits can be entered and displayed. Negative octal values are expressed by their complement. The calculation range is defined as follows:



↓ Out of the Range

*If the result of a calculation is out of the range, error occurs.

Hexadecimal Numbers

A maximum of 10 hexadecimal digits can be entered and displayed. Negative hexadecimal values are expressed by their complements. The calculation range is defined as follows:

↑ Out of the Range

2540BE3FF.

Positive Value ⎫
1. ⎪
0 ⎬ Calculation Range
FFFFFFFFFF ⎪
Negative Value ⎭
FDABF41C01.

↓ Out of the Range

. *If the calculation result is out of the range, an error occurs.

.The hexadecimal numbers A to F are displayed as follows:

A	B	C	D	E	F
↓	↓	↓	↓	↓	↓
A	b	C	d	E	F

<Complement>

In the calculation the complement can express the negative value without using "+" and "–"signs. Add the complement, subtraction will be performed.

Example: Enter 1 in the binary and subtract 1 for 3 times.

Key Operation	Display	Decimal
[MODE][2/→BIN]		
[1]	(1.)	1
[-][1][=]	(0.)	0
[=]	(1111111111.)	-1
[=]	(1111111110.)	-2

6. Statistical Calculations

Clear All Registers Before Calculation

Press **[MODE][5/→SD]** to set the statistical mode. All function command and all registers except in the memory register will be cleared.

The statistical calculation results are accumulated in the statistical calculation register ,so you can quit to another mode, then reset to the statistical mode and perform the statistical calculation.

Entering Statistical Data

Example 1 : **[2][DATA][3][DATA][4][DATA]**
Example 2 : **[1][2][5][log][DATA][1][0][0][log][DATA]**
Example 3 : **([1][2][3][M+][RM][DATA])**

Operations Not Available

When the number of calculation nesting levels exceeds 3, operations are not available:

Correcting Statistical Data

Example 1: **[1][DATA][2][DATA][4][C/CE] [3][DATA]**

Example 2 : [1][DATA][2][DATA][3][DATA][3][INV][DEL]

Example 3 : [1][DATA][2][DATA][3][DATA][1][INV][DEL]

Example 4 : [2][·][3][DATA][1][·][8][DATA]
[2][·][2][DATA][5][·][4][DATA]
[INV][$\bar{x}$] (2.925)
[5][-][4][INV][DEL][INV][$\bar{x}$] (2.1)

Output of Statistical Calculation Results

Output	Operation	Equation
Mean	[INV][$\bar{X}$]	$x=\frac{\sum_{i=1}^{n} x_i}{n}$
Standard deviation of sample	[INV][σ^{n-1}]	$\sigma^{n-1}=\sqrt{\sum_{i=1}^{n}(x_i-\bar{X})^2/(n-1)}$
Standard deviation population parameter	[INV][σ^{n}]	$\sigma^{n}=\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2/n}$
Variance of sample	[INV][σ^{n-1}][X^2]	$V^{n-1}=\sum_{i=1}^{n}(x_i-\bar{X})^2/(n-1)$
Variance of population	[INV][σ^{n}][X^2]	$V^{n}=\sum_{i=1}^{n}(x_i-\bar{X})^2/n$
Sum	[INV][Σx]	Σx
Square sum	[INV][Σx^2]	Σx^2

[n] key (number of data)

7. Logical Calculations

Logical Calculations

The variables in the logical calculation only have two values, the value of truth and false. The results are also given by either truth or false. Truth is expressed "1" and false is "0", which corresponds to the binary expression. In the octal or hexadecimal calculations, the values are converted to the octal or hexadecimal.

Types of logical calculations and the truth table

("true"=1, "false"=0)

AND : Product of propositions.
It produces 1 when all input values are 1.

OR : Sum of propositions.
It produces 1 when one or more input values are 1.

XOR : Exclusive sum of propositions .
It produces 0 when all input values are either 1 or 0. Other cases are the same as **OR**.

XNOR :Opposite of **XOR** , it is the combination of **XOR** and **NOT**.

NOT Negative
It produces the opposite values of the input number.

AND

Truth table

INPUT		OUTPUT
A	B	X
1	1	1

1	0	0
0	1	0
0	0	0

AND

Symbol

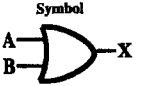
OR

Truth table

INPUT		OUTPUT
A	B	X
1	1	1
1	0	1
0	1	1
0	0	0

OR

Symbol

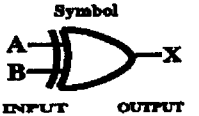


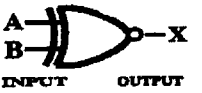
Truth Table

INPUT		OUTPUT	
A	B	XOB	XNOR
1	1	0	1
1	0	1	1
0	1	1	0
0	0	0	1

XOR, XNOR

Symbol

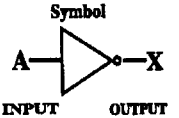




INPUT X	OUTPUT X
1	0
0	1

NOT

Symbol



8. Errors

When the display overflows, further calculations are not available because the calculator will be electronically locked:

1. When the calculation result is out of the following range:
   $x=0,1\times10^{-99}\leqq|x|\leqq9.999999999\times10^{99}$
   x: Calculation result
2. When the contents of the memory are out of the following range:
   $x=0,1\times10^{-99}\leqq|x|\leqq9.999999999\times10^{99}$
   x: Memory contents
   (The data stored before the error overflow is automatically retained.)
3. When entered numbers are out of the following range a basic function key (+,-, $\times$, $\div$) is depressed.

$x=0,1\times10^{-99}\leqq|x|\leqq9.999999999\times10^{99}$

4. When a calculation (0 as a divisor) is performed.
5. When the data exceeds the range of any function or statistical calculation.
6. In the statistical calculation mode, if only use one data to calculate.
   (1)To calculate x, δ^{n} and δ^{n-1}, when n=0
   (2)When n<0 or $n\geqq10^{10}$
7. When the number of operators stored in the register during parentheses and arithmetic calculation exceeds 6 levels.
8. When the number of calculation nesting levels exceeds 3 in statistical mode.
9. When more than 15 open parentheses are used at one time.

The overflow display **[E 0.]**
To clear the overflow error, just press**[C/CE]**.

II. CALCULATION EXAMPLES

1. Decimal calculations

Mode setting:

Calculation Mode : **Decimal Mode (DEG)**
MODE][1/→DEC]
Display Mode : **Floating Point [INV][FLO]**
Decimal Point : **Reset [INV][FIX][.]**

Expression	Operation (Display)

Addition and Subtraction

8+3+5.5=16.5	**[8][+][3][+][5][.][5][=]** (16.5)
4-7-3 = - 6	**[4][-][7][-][3][=]** (-6.)

Multiplication and Division

3.6×1.7= 6.12	**[3][.][6][×][1][.][7][=]** (6.12)
592÷4.8= 123.3333333	**[5][9][2][÷][4][.][8][=]** (123.3333333)

Mixed Calculation

3+5×7=38	**[3][+][5][×][7][=]** (38.)
6×9+3÷2=55.5	**[6][×][9][+][3][÷][2][=]** (55.5)

Exponential Calculation

$(321\times10^{-14})\times(65\times10^{28})$ $=2.0865\times10^{18}$	**[3][2][1][EXP][1][4][+/-][×] [6][5][EXP][2][8][=]** (2.0865^{18})

Fractional Calculation

$\frac{2}{3}+3\frac{4}{7}-\frac{5}{4}=2\frac{83}{84}$	**[2][a b/c][3][+][3][a b/c][4][a b/c] [7][-][5][a b/c][4][=]** (2_83 _84.)
$(\frac{3}{5}+2\frac{3}{8})\times\frac{2}{5}\div2-1$ $=-\frac{81}{200}$	**[( ][3][a b/c][5][+][2][a b/c][3] [a b/c][8][ )][×][2][a b/c][5] [÷][2][-][1][=]** (- 81_200.)

Constant Calculation

2+3= 5	**[2][+][3][=]** (5.)
4+3= 7	**[4][=]** (7.)
1. 2= -1	**[1][-][2][=]** (-1.)
2-2=0	**[2][=]** (0.)
3×2= 6	**[3][×][2][=]** (6.)
4×2= 8	**[4][=]** (8.)
6÷3= 2	**[6][÷][3][=]** (2.)
9÷3= 3	**[9][=]** (3.)

Parentheses Calculation

3+((4-3.6+5)× 0.8-6)×4.2 = - 4.056	[3][+][(][(][)][4][-][3][.] [6][+][5][)][)][×][.][8][-] [6][)][×][4][.][2][=] (- 4.056)

Percentage Calculation

200×17%=34	[2][0][0][×][17][INV][%][=] (34.)
456/789×100= 57.79467681%	[4][5][6][÷][7][8][9][INV][%] [=] (57.79467681)

Add On Calculation

200+(200×20%) = 240	[2][0][0][+][2][0][INV][%] [=] (240.)

Discount Calculation

200–(200×20%) =160	[2][0][0][-][2][0][INV][%] [=] (160.)

Constant Percentage Calculation

1200×12%=144	[1][2][0][0][×][1][2] [INV][%][=] (144.)
1500×12%=180	[1][5][0][0][=] (180.)
765/987=77.50759878%	[7][6][5][÷][9][8][7][INV] [%][=] (77.50759878)
654/987=66.26139818%	[6][5][4][=] (66.26139818)

Memory Calculation

20×30= 600	[0][AC]	(0.)
40×50= 2000	[2][0][×][3][0][=][M+]	(M 600.)
+)15×20= 300	[4][0][×][5][0][=][M+]	(M 2000.)
2900	[1][5][×][2][0][=][M+]	(M 300.)
	[RM]	(M 2900.)
	[1][2][5][×][4][0][=]	
-)125×40 –5000	[+/-][M+]	(M –5000.)
- 2100	[RM]	(M –2100.)
	[C/CE][AC]	(0.)

Composition Ratio Calculation

	[1][2][5][+][1][8][5][+] [1][9][0][=][X→M]	
A 125 (25%)		(M 500.)
B 185 (37%)	[1][2][5][÷][RM][INV][%][=][X→M]	
C 190 (38%)		(M 25.)
(500) (100%)	[1][8][5][=][M+]	(M 37.)
	[1][9][0][=][M+]	(M 38.)
	[RM]	(M 100.)

2. Binary/Octal/Hexadecimal Calculations

1). Binary Calculations

Calculation Mode:

Binary(BIN) [MODE][2/→BIN]

Addition and subtraction

10101011+1100+ 1110=11000101	[1][0][1][0][1][0][1][1] [+][1][1][0][0][+][1][1] [1][0][=] (11000101)
11100011 - 10101100 =110111	[1][1][1][0][0][0][1][1] [-][1][0][1][0][1][1][0] [0][=] (110111.)

Multiplication and Division

11×1001=11011	[1][1][×][1][0][0][1][=] (11011.)
1101111÷1010 ≒1011	[1][1][0][1][1][1][1][÷] [1][0][1][0][=] (1011.)

Mixed Calculation

(101010+1100)x11 ÷1111=1010	[(][1][0][1][0][1][0][+] [1][1][0][0][)][×][1][1] [÷][1][1][1][1][=] (1010.)

2). Octal Calculations

Calculation Mode:

Octal(OCT) [MODE][3/OCT]

Addition and Subtraction

654+321=1175	[6][5][4][+][3][2][1][=] (1175.)
741-357=362	[7][4][1][-][3][5][7][=] (362.)

Multiplication and Division

56×23=1552	[5][6][×][2][3][=] (1552.)
621÷12=50	[6][2][1][÷][1][2][=] (50.)

Mixed Calculation

52+63×14 =1216	[5][2][+][6][3][×][1][4] [=] (1216.)

3). Hexadecimal Calculation

Calculation Mode :

Hexadecimal(HEX) [MODE][4/→HEX]

Addition and Subtraction

AAA+BB+C=B71	[A][A][A][+][B][B][+][C] [=] (B71.)
DEF-EFE= FFFFFFFEF1	[D][E][F][-][E][F][E][=] (FFFFFFFEF1.)

Multiplication and Division

FEDC×A9 =A83F3C.	[F][E][D][C][×][A][9][=] (A83F3C.)
CA11÷DF=E7	[C][A] [1] [1][÷][D][F][=] (E7.)

Mixed Calculation

(AB+C)xD÷F =9E	[(][A][B][+][C][)][x][D] [÷][F][=] (9E.)

Calculations combining binary, octal, decimal and hexadecimal numbers are also available.

3. Basic Function Calculations

Trigonometric Function

Sin53° =0.79863551	[AC][5][3][sin] (DEG 0.79863551)
$\tan 65^{GRAD}$=1.631851687	[AC][DRG][DRG][6][5][tan] (GRAD 1.631851687)
$\sin \pi/3^{RAD}$ = 0.866025403	[AC] [DRG] [INV] [π] [÷][3][=][sin] (RAD 0.866025403)

Inverse Trigonometric Function

$\sin^{-1}$ 0.3=17.45760312°	[AC][·][3][INV][$\sin^{-1}$] (DEG 17.45760312)
$\cos^{-1}$ 0.8=36.86989765°	[·][8][INV][$\cos^{-1}$] (DEG 36.86989765)
$\tan^{-1}$ 1.5=56.30993247	[1][·][5][INV][$\tan^{-1}$] (DEG 56.30993247)
$\sin^{-1}$ 1=1.570796327 (rad)	[DRG][1][INV][$\sin^{-1}$] (RAD 1.570796327)

Logarithmic Function

log123=2.089905111	[AC] [1][2][3][log] (2.089905111)
ln123=4.812184355	[1][2][3][ln] (4.812184355)

Exponential Function

e^{22}=3584912846.	[AC] [2][2][INV][e^x] (3584912846)
$10^{2.3}$=199.5262315	[2][.][3][INV][10^x] (199.5262315)

Square Calculation

1.25^2=1.5625	[1][.][2][5][x^2] (1.5625)

Power Calculation

5.43^3=160.103007	[5][.][4][3][Y^x][3] [=] (160.103007)
$2^{3.4}$ =10.55606329	[2][Y^x][3][.][4] [=] (10.55606329)

Constant Power Calculation

$2^{2.34}$ =5.063026376	[2][Y^][2][.][3][4][=] (5.063026376)
$3^{2.34}$ =13.07566351	[3][=] (13.07566351)
$4^{2.34}$ =25.63423608	[4][=] (25.63423608)

Extraction of Square Root

$\sqrt{(5+6)\times 7}$= 8.774964387	[(][5][+][6][)][×][7][=] [INV][√‾] (8.774964387)

Extraction Multiple Root

$\sqrt[5.3]{100}$ =2.384286779	[1][0][0][INV][$\sqrt[x]{Y}$][5][.][3] [=] (2.384286779)

Extraction of Cubic Root

$\sqrt[3]{123}$ =4.973189833	[1][2][3][INV][$\sqrt[3]{}$] (4.973189833)

Reciprocal Calculation

$\frac{1}{2\times 3+4}=0.1$	[2][×][3][+][4][=][1/x] (0.1)

Factorial Calculation

(4×2-3)!=120	[4][×][2][-][3][=][INV][n!] (120)

Trigonometric Calculation

cosec x=1/sinx cosec 45= 1.414213562	[AC][4][5][sin][1/x] (DEG 1.414213562)

Hyperbolic Function

cosh34= 2.917308713×10^{14} tanh1.23= 0.842579325	[3][4][HYP][cos] (2.917308713^{14}) [1][.][2][3][HYP][tan] (0.842579325)

Inverse Hyperbolic Function

$\mathrm{Sinh}^{-1}\,1.5\times 10^{25}$ = 58.66323961	[1][.][5][EXP][2][5] [INV][HYP] [sin] (58.66323961)

Degree→Radian Conversion

60° =1.047197551^{RAD}	[AC][6][0][INV][DRG] (RAD 1.047197551)

Radian→Gradient conversion

2^{RAD}= 127.3239545^{GRAD}	[AC][DRG][2][INV][DRG] (GRAD 127.3239545)

Gradient→Degree Conversion

120^{GRAD}=108°	[AC][DRG][DRG][1][2][0] [INV][DRG] (DEG 108.)

Logarithmic Mean

$\bar{L}=\frac{4-8}{\ln 4-\ln 8}$ =5.770780164	[(][4][-][8][)][÷][(][ln][4] [ln][-][8][ln][)][=] (5.770780164)

Geometric Mean

$\bar{G}=\sqrt[4]{1.23\times 1.48\times 1.96\times 2.2}$ =1.673830182	[1][.][2][3][×][1][.][4] [8][×][1][.][9][6][×] [2][.][2][=][INV][$\sqrt[x]{Y}$][4] [=] (1.673830182)

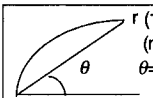
Permutation

${}_nP_r=\frac{n!}{(n-r)!}$ ${}_5P_3=\frac{5!}{(5-3)!}=60$	[5][INV][n!][÷][(][5][-][3][)] [INV][n!] [=] (DEG60.)

Combination

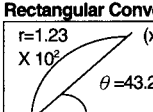
${}_nC_r=\frac{n!}{r!(n-r)!}$ ${}_5C_3=\frac{5!}{3!(5-3)!}=10$	[5][INV][n!][÷][(][3][INV] [n!][×][(][5][-][3][)] [INV][n!][)][=] (DEG 10.)

Polar Conversion



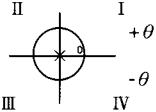
[AC][1][INV][X⇄Y][3]
[INV][√‾][R→P] (2.)
[INV][X⇄Y]
(DEG 60)

Rectangular Conversion



[AC][1][.][2][3][EXP][2]
[INV] [X ⇄ Y] [4][3][.][2]
[INV][P→R]
(DEG 89.66314117)
[INV][X ⇄ Y]
(DEG 84.19929403)

In polar conversion the third and fourth quadrant shows as follows:



Degree-Minute-Second→Decimal Degree

123° 45′06″→ 123.7516667°	**[1][2][3][.][4][5][0][6]** **[→DEG]** (123.7516667)

Decimal Degree→Degree-Minute-second

2.3456° → 2° 20′ 44.16″	**[2][·][3][4][5][6][INV]** **[→DEG]** (2.° 20′ 44′16)

4. Statistical Calculations

Calculate the number (n),mean value($\overline{X}$), standard deviation sample(δ^{n-1}), variance(V^{n-1}), standard deviation population parameter (δ^{n}), variance of population(V^{n}), sum(Σx) and square sum (Σx^2).

Statistics

Statistical Calculations (average, standard deviation). You bought two big biscuits for party . Big biscuits' diameter is 30(cm) originally. But their size will deviate as follows:

Diameter (cm)	Midpoint (cm)	Frequency
27.6~28.5	28	2
28.6~29.5	29	4
29.6~30.5	30	5
30.6~31.5	31	6
31.6~32.5	32	3
		20

Operation	Display	Explanation
[MODE][5] **[INV][FIX][4]**	0. 0.0000	Statistic mode
[2][8][×][2][DATA] **[2][9][X][4][DATA]** **[3][0][×][5][DATA]** **[3][1][×][6][DATA]** **[3][2][×][3][DATA]**	2.0000 6.0000 11.0000 17.0000 20.0000	Gives the sum of frequency
[INV][n]	20.0000	Total number of data
[INV][$\overline{X}$]	30.2000	Mean
[INV][Σx]	604.0000	Sum of the values
[INV][Σx^2]	18270.0000	The square sum of value
[INV][δ^{n-1}]	1.2397	Standard deviation of sample

[INV][δ '']	1.2083	Standard deviation of population

5. Logical Calculations

Example: Calculate **AND** and **OR** with (1100) and (1010) in the binary.

Key Operation Display

[MODE][2/→BIN]

1100 **[AND]** 1010 **[=]** (1000.)

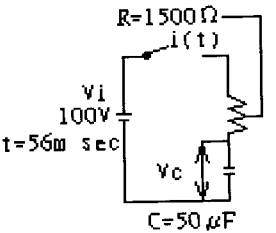
1100 **[OR]** 1010 **[=]** (1110.)

Logical Calculations in binary/octal/hexadecimal

Mode	Operation	Display
Binary	**[MODE][2/→BIN]**	
	[1][0][1][0][1][0][AND]	
	[1][1][1][0][0][0][=]	101000.
	[1][0][1][0][1][0][OR]	
	[1][1][1][0][0][0][=]	111010.
	[1][0][1][0][1][0][XOR]	
	[1][1][1][0][0][0][=]	10010.
	[1][0][1][0][1][0][XNOR]	
	[1][1][1][0][0][0][=]	1111101101.
	[1][0][1][0][1][0][NOT]	1111010101.
Octal	**[MODE][3/→OCT]**	
	[1][2][3][4][5][6][AND]	
	[7][6][5][4][3][2][=]	121412.
	[1][2][3][4][5][6][OR]	
	[7][6][5][4][3][2][=]	767476.
	[1][2][3][4][5][6][XOR]	
	[7][6][5][4][3][2][=]	646064.
	[1][2][3][4][5][6][XNOR]	
	[7][6][5][4][3][2][=]	7777131713.
	[1][2][3][4][5][6][NOT]	7777654321.

Hexa deci mal	**[MODE][4/→HEX]**	
	[7][8][9][A][B][C][AND]	
	[1][4][7][2][5][8][=]	101218.
	[7][8][9][A][B][C][OR]	
	[1][4][7][2][5][8][=]	7CFAFC.
	[7][8][9][A][B][C][XOR]	
	[1][4][7][2][5][8][=]	6CE8E4.
	[7][8][9][A][B][C][XNOR]	
	[1][4][7][2][5][8][=]	FFFF93171b
	[7][8][9][A][B][C][NOT]	FFFF876543

6. Applied Calculations



Electric Circuit Problem

Calculate the voltage (Vc)between two poles of the condenser when t=56 m sec.

$$Vc=Vi(1-e^{-\frac{1}{RC}})\times 100\times(1-e^{-\frac{56\times10^{-3}}{150\times50\times10^{-6}}})$$
$$=52.6052649$$

[1][0][0][×][(][1][-][(][1][5][0][0][×][5][0][EXP][6][+/-][÷][5][6][EXP][3][+/-][)][1/X][+/-][INV][e^x][)][=] (52.60562649)

[Algebra]

The Root of a unknown Quantity and Quadratic Equation

$4X^2+9X+2=0$

$X=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-9\pm\sqrt{9^2-4x4x2}}{2x4}$

$X=\{\begin{matrix}-0.25\\-2\end{matrix}$

[9][X^2][-][4][×][4][×][2][=][X→M] (M 49)

[( ][9][+/-][+][RM][INV][√][ )][÷][2][÷][4][=] (M –0.25)

[( ][9][+/-][-][RM] [INV][√][ )][÷][2][÷][4][=] (M -2)

[Calculation of time]

Departing at 2 o'clock 9 minute and 56 second (2.095600), reaching at 4 o'clock 18 minute and 23 second (4.182300). What is the travel time?

---

[4][.][1][8][2][3][→DEG][-][2][.][0][9][5][6] [→DEG][=][INV][→DMS]

2 hours 8 minutes 27 seconds (2 ° 08'27")

[Calculation of time]

The part-time working time is as follows. What is the total time?

.1st day: 5 hours 46 minutes

.2nd day: 4 hours 39 minutes

.3rd day: 3 hours 55 minutes

---

[5][.][4][6][→DEG][+][4][.][3][9][→DEG][+][3][.] [5][5][→DEG][=][INV][→DMS]

14 hours 20 minutes (14° 20'00")

7. Calculation Range of Functions

Function	Calculation Range
sin x	DEG $x=0,\ 5.729577951\times10^{-99}<\|x\|\leqq4.499999999\times10^{10}$ RAD $0\leqq\|x\|\leqq785398163.3$ GRAD $x=0,\ 6.366197723\times10^{-99}<\|x\|\leqq4.999999999\times10^{10}$
cos x	DEG $0\leqq\|x\|\leqq4.500000008\times10^{10}$ RAD $0\leqq\|x\|\leqq785398164.9$ GRAD $0\leqq\|x\|\leqq5.000000009\times10^{10}$
tan x	DEG $x=0,\ 5.729577951\times10^{-99}<\|x\|\leqq4.499999999\times10^{10}$ $\|x\|\neq90°+180°\times n$ RAD $0\leqq\|x\|\leqq785398163.3\times\neq90°+180°\times n$ GRAD $x=0,\ 6.366197723\times10^{-99}<\|x\|\leqq4.999999999\times10^{10}$ $\|x\|\neq90°+180°\times n$
Function	Input Range
$\sin^{-1}x$	DEG $x=0,\ 1.570796326\times10^{-99}<\|x\|\leqq1$ RAD $0\leqq\|x\|\leqq1$ GRAD $x=0,\ 1.570796326\times10^{-99}<\|x\|\leqq1$
$\cos^{-1}x$	DEG $0\leqq\|x\|<1$ RAD $0\leqq\|x\|<1$ GRAD $0\leqq\|x\|<1$
$\mathrm{Tan}^{-1}x$	DEG $x=0,\ 1.570796326\times10^{-99}<\|x\|\leqq9.999999999\times10^{99}$ RAD $0\leqq x\leqq9.999999999\times10^{7}$ GRAD $x=0,\ 1.570796326\times10^{-99}<\|x\|\leqq9.999999999\times10^{99}$
ln x	$0<x$

log x	0<x
e^x	-227.9559243<x≦230.2585092
10^x	-99.00000001<x≦99.99999999
n!	0≦x≦69(× ◆ integer)
1/x	$1\times10^{-99}\leqq\|x\|\leqq1\times10^{99}$
x^2	X=0,$3.162277660\times10^{-50}$ <|x|<9.999999999×10^{49}
$\sqrt{X}$	$0\leqq x\leqq9.999999999\times10^{99}$
$\sqrt[3]{X}$	$0\leqq\|x\|\leqq9.999999999\times10^{99}$
Y^x	y>0,-227.9559243 ≦ x · lnIyl ≦ 230.2585092
$\sqrt[X]{Y}$	y>0,-227.9559243 ≦ (lnIyl)x ≦ 230.2585092

III Specifications

Exponential Type : Mantissa, 10 Digits exponent, 2 digits
Floating Type : Mantissa, 10 Digits + sign, 1 digit
Calculation Range:
Decimal: $\pm1\times10^{-99}$to$\pm9.999999999\times10^{99}$
Binary: 111111111 to 1000000000
Octal: 3777777777 to 0 to 4000000000
Hexadecimal: 2540BE3FF to 0 to FDABF41C01.
Power Source : Dual power supply. Operated by solar cell with battery (1 pc CR 2016 or equivalent type) back up.
Usable Temperature: 0° ~40° C(32° F~104° F)
Size : 132(L)×76(W)×11(H)mm (5-33/64" ×3"×7/16")
Weight : 64g (2.25oz)
Note : Subject to change without notice.

IV Power Supply

- This calculator comes with a dual power source, either solar cell or alkaline battery.
- Generally, under normal room lighting, the calculator is powered by a built –in solar cell. When the light level drops beyond a certain point, it switches over automatically to battery power.
- The duration of alkaline batteries depends entirely on individual usage. When the batteries are exhausted, you can still use the solar cell to power the calculator.
- Loud external noise or static electricity may cause the display to malfunction or the contents of the memory to be lost or altered. Should this occur, press the **[C/CE]** and **[AC]** key and restart your calculation from the beginning.

Battery Replacement